



Gandhi Institute of Engineering and Technology University, Odisha, Gunupur (GIET UNIVERSITY)

M.Sc. (Second Semester - Regular) Examinations, July - 2025

21MCYPC12002 – Inorganic Chemistry-II

(Chemistry)

Time: 3 hrs

Maximum: 60 Marks

(The figures in the right hand margin indicate marks)

PART – A

(2 x 5 = 10 Marks)

Q.1. Answer **ALL** questions

- | | CO # | Blooms Level |
|---|------|--------------|
| a. Calculate the effective atomic number of a single metal atom
Fe (CO) ₁₂ , Mn ₂ (CO) ₁₀ | CO3 | K2 |
| b. Determine the structure of Ru ₆ C(CO) ₁₇ | CO3 | K2 |
| c. What is kinetics stability? | CO1 | K1 |
| d. Write a note on remote attack. | CO2 | K1 |
| e. Define transition metal carbene. | CO1 | K2 |

PART – B

(10 x 5 = 50 Marks)

Answer **ALL** the questions

- | | Marks | CO # | Blooms Level |
|--|-------|------|--------------|
| 2. a. Calculation of Metal-Metal bond and structure of the following complexes
(a) Co ₄ (CO) ₁₂ (b) Fe ₃ (CO) ₁₂ (c) Ir ₄ (CO) ₁₂ | 6 | CO3 | K3 |
| b. Identify the 18 electron species.
η ⁵ -C ₆ H ₅ Fe (CO) ₂ Cl, η ³ -C ₅ H ₅ η ⁵ -C ₅ H ₅ Fe CO
(OR) | 4 | CO3 | K3 |
| c. Write the preparation, properties and structure of Fe (CO) ₅ | 10 | CO2 | K1 |
| 3.a. Write down the preparation properties of Carbides. | 6 | CO2 | K1 |
| b. Determine the structure of heteroboranes (C ₂ B ₇ H ₁₃) and (C ₂ B ₂ H ₆)
(OR) | 4 | CO4 | K2 |
| c. Explain different Kinetics of octahedral substitution. | 10 | CO5 | K2 |
| 4.a. Classify the following complex ions as inert or labile and how?
[Ti(H ₂ O) ₆] ²⁺ , [Co(H ₂ O) ₆] ³⁺ and [PtCl ₆] ²⁻ | 6 | CO4 | K2 |
| b. Write down the preparation of carboranes.
(OR) | 4 | CO2 | K1 |
| c. Explain evidences in favour of conjugate base mechanism. | 10 | CO4 | K2 |
| 5.a. Discuss different types of stability constants of complexes.
(OR) | 6 | CO4 | K3 |
| b. Classify different types of transition metal carbene and explain synthesis of carbene complex | 10 | CO5 | K2 |
| 6.a. Write notes on the following:
(a) Chelate effect (b) Steric effect | 6 | CO4 | K1 |
| b. Citing an example discuss the Inner sphere mechanism of electron transfer reaction.
(OR) | 4 | CO5 | K1 |
| c. Explain difference between singlet carbene and triplet carbene . | 6 | CO3 | K2 |
| d. Find out the product A and B and draw the structure
[PtCl ₄] ²⁻ + NH ₃ → A + NH ₃ → B | 4 | CO5 | K3 |

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